REMARKS

These amendments and remarks are filed in response to the final Office Action mailed April 27, 2009. For the following reasons, this amendment should be entered, the application allowed and the case passed to issue. No new matter is introduced by this amendment and this amendment clearly places the application in condition for allowance. The amendment to claim 6 is supported by the specification and places the claim in independent form.

Claims 1-17 are pending in this application. Claims 1-17 were rejected. Claim 6 has been amended.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 6, 7, 9, 11, and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al. (US 6,376,111) in view of Busenbender (US 2003/0039870) and Suzuki et al. (US 2001/0010872). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as claimed, and the cited prior art.

Mathias, Busenbender, and Suzuki et al., whether taken alone, or in combination, do not suggest the feature of controlling the moisture-adjusted gas generating mechanism to supply the moisture-adjusted gas adjusted to the target humidity to at least one of the anode and cathode after power generation in the fuel cells is halted, as required by claim 1.

Claim 1 requires a programmable controller programmed to: determine a target humidity based on the temperature of the fuel cells after power generation is halted; control the moisture-adjusted gas generating mechanism such that the humidity of the moisture-adjusted gas matches the target humidity; and control the moisture-adjusted gas generating mechanism to supply the

moisture-adjusted gas adjusted to the target humidity to at least one of the anode and cathode after power generation in the fuel cells is halted.

As acknowledged by the Examiner, Mathias is silent concerning the measurement of temperature to control the humidity within the fuel cell and to determine a target based on the temperature of the fuel cells after power generation is halted. Busenbender teaches a temperature sensor and Suzuki et al. teach a control system which directs dry air directly to the fuel cell to remove residual moisture, thereby changing the humidity level to prevent freezing.

Supplying dry air to fuel cells after the operation of the fuel cells has halted is a known effective technique to prevent freezing of the fuel cell. However, simply supplying dry gas to the anode or cathode of the fuel cell causes the electrolyte membrane to dry out as explained in the Summary of The Invention of the present disclosure.

Accordingly, an object of the present invention is to prevent ice from blocking the gas supply in a fuel cell upon restarting the fuel cell in freezing temperatures, while maintaining the electrolyte in a wet condition. This object is accomplished by determining a target humidity based on the temperature of the fuel cells after power generation is halted such that water vapor in the moisture-adjusted gas does not condense when supplied to at least one of the anode and cathode after power generation in the fuel cells is halted, and supplying the moisture-adjusted gas adjusted to the target humidity to at least one of the anode and cathode after power generation in the fuel cells is halted.

As regards independent claim 6, Mathias, Busenbender, and Suzuki et al. do not suggest that the target humidity is set to be higher when the wet condition of the fuel cells is drier than a predetermined wet region than when the wet condition of the fuel cell is wetter than the predetermined region.

The Examiner opined that Mathias discloses a fuel cell system which comprises a sensor (42) which detects a wet condition of the fuel cell and the controller (44) is further programmed to set the target humidity higher when the wet condition of the fuel cell is drier than a predetermined level of a membrane wet region (Column 4, Lines 1-18). Mathias, however, teaches humidity control when the fuel cells are operating, but does not teach humidity control after the fuel cells have halted operation. Control of the humidity of the moisture-adjusted gas when the fuel cell system is operating cannot be adapted to control of the same when the fuel cell system is not operating, because the conditions are very different. For example, moisture is generated in the fuel cell when it is operating, but no moisture is generated when the fuel cell is not operating. Accordingly, the target humidity of the moisture-adjusted gas when the fuel cell is operating is different from that when it is not. It is far from practical to apply a humidity control criteria for operation of the fuel cells, for a non-operating state of the same.

In claim 6, the target humidity is not a humidity corresponding to a dry state, but rather, corresponds to a wet condition corresponding to the predetermined region. Though some of the references teach supplying dry air after operation of the fuel cells has been halted in order to prevent fuel cells from freezing, none of the references teach or suggest maintaining the wet condition of the fuel cells in the predetermined region, as required by claim 6.

The above processes of determining the target humidity of the moisture-adjusted gas are not disclosed or suggested in any of Mathias et al., Busenbender, and Suzuki et al.

Claims 3, 4, 8, 16, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al., Busenbender, and Suzuki et al., and further in view of Nonobe (US 6,524,733).

Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al., Busenbender, and Suzuki et al., and further in view of Ban et al. (US 6,350,536).

Claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al., Busenbender, and Suzuki et al., and further in view of Ban et al. and Gilbert (US 2003/0170506).

Claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al., Busenbender, and Suzuki et al., and further in view of Walsh (US 2002/0182466).

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested.

Mathias et al., Busenbender, Suzuki et al., Nonobe, Ban et. al., Gilbert, and Walsh, whether taken in combination, or taken alone, do not suggest the claimed fuel cell system. Nonobe, Ban et al., Gilbert, and Walsh do not cure the deficiencies of Mathias et al., Busenbender, and Suzuki et al., as Nonobe, Ban et al., Gilbert, and Walsh do not suggest controlling the moisture-adjusted gas generating mechanism to supply the moisture-adjusted gas adjusted to the target humidity to at least one of the anode and cathode after power generation in the fuel cells is halted, as required by claim 1.

Claim 14 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al. and further in view of Nonobe and Ban et al.

Claim 15 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al. in view of Nonobe and Ban et al.

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested.

The Examiner asserted that Nonobe teaches a controller (60) which controls the moisture-adjusted gas generating mechanism (23, 24) to provide a target humidity based on the

temperature of the fuel cell and wet conditions of the fuel cell (Column 5, Lines 50-64) and halts the supply of moisture-adjusted gas as required (Column 7, Lines 5-14) to increase the efficiency of the fuel cell.

The disclosure by Nonobe, however, is related to control of moisture-adjusted gas **while the fuel cell system is operating**. Nonobe does not disclose or suggest control of moisture-adjusted gas **after the fuel cell system has halted operation**.

Control of the humidity of the moisture-adjusted gas when the fuel cell system is operating cannot be adapted to control of the same when it is not operating, because the related conditions are very different. For example, moisture is generated in the fuel cell when it is operating, but no moisture is generated when the fuel cell is not operating. Accordingly, the target humidity of the moisture-adjusted gas when the fuel cell is operating is different from that when it is not. It is far from practical to apply a humidity control criteria for operation of the fuel cells, for a non-operating state of the same.

The target humidity determining process carried by the target humidity determining means according to claim 14 and determining a target humidity based on a temperature of the fuel cells after power generation is halted according to claim 15 are not disclosed or suggested by any of Mathias, Nonobe, and Ban et al.

The dependent claims are allowable for at least the same reasons as claim 1 and further distinguish the claimed fuel cell system.

In view of the above amendments and remarks, Applicants submit that this amendment should be entered, the application allowed, and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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